

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (previously amended): In a method of etching a surface of a wafer with a microscopic roughness to prepare the wafer surface for receiving a deposition of a material on the wafer surface, the steps of

removing a thin layer from the surface of the wafer to eliminate any impurities from the surface of the wafer, and

thereafter creating the microscopic roughness on the surface of the wafer to receive a deposition of the material on the surface by providing ions of an inert gas with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer.

Claim 2 (cancelled)

Claim 3 (previously presented): In a method as set forth in claim 2 wherein the inert gas is argon.

Claim 4 (previously amended): In a method as set forth in claim 1 wherein the wafer is disposed on a waferland and wherein

a layer of chromium is deposited on the waferland after the microscopic roughness has been produced on the surface of the wafer.

Claim 5 (previously amended): In a method of providing for an attachment of an electrical component to a wafer, the steps of:

removing a thin layer from the surface of the wafer,

thereafter depositing a chromium layer with a low intrinsic tensile stress on the cleaned surface of the wafer, and

thereafter depositing a layer of nickel vanadium with an intrinsic stress on the surface of the chromium layer to neutralize the low intrinsic tensile stress produced by the chromium layer.

Claim 6 (previously amended): In a method as set forth in claim 5 wherein a microscopic roughness is produced on the surface of the wafer after the thin layer of the wafer has been removed from the surface of the wafer and wherein the chromium layer is thereafter deposited on the microscopically rough surface of the wafer and wherein a low rate of flow of an inert gas is provided on the wafer layer when the chromium layer is deposited on the surface of the wafer thereby to minimize the presence of the inert gas in the chromium layer.

Claim 7 (currently amended): In a method as set forth in claim 5 wherein a waferland is disposed in an abutting relationship with the wafer and wherein a layer of chromium is deposited on the surface of the waferland ~~before~~ after etching the surface of the wafer.

Claim 8 (previously presented): In a method as set forth in claim 5 wherein the chromium layer is deposited on the surface of the wafer to produce an intrinsic tensile stress in the chromium layer and wherein the nickel vanadium layer is deposited on the surface of the chromium layer with an RF bias power to produce an intrinsic compressive stress in the nickel vanadium layer.

Claim 9 (previously amended): In a method as set forth in claim 5 wherein the chromium is deposited in a layer on the microscopically rough surface of the wafer to produce an intrinsic tensile stress with a low stress value in the chromium layer and wherein

the nickel vanadium layer is deposited on the surface of the chromium layer to produce a low intrinsic compressive stress with a value to neutralize the low intrinsic tensile stress in the chromium layer.

Claim 10 (previously presented): In a method as set forth in claim 7 wherein the chromium is deposited in a layer on the microscopically rough surface of the wafer in an intrinsic tensile stress with a low stress value and wherein

the layer of the nickel vanadium is deposited on the surface of the chromium in an intrinsic compressive stress with a low stress value substantially neutralizing the low stress value of the intrinsic tensile stress of the chromium layer.

Claim 11 (previously amended): In a method of providing for an attachment of an electrical component to a wafer, the steps of:

removing a thin layer from the surface of the wafer, and
depositing a chromium layer with a low intrinsic tensile stress on the surface of the wafer after the removal of the thin layer from the surface of the wafer.

Claim 12 (previously amended): In a method as set forth in claim 11 wherein the surface of the wafer is provided with a microscopic roughness after the thin layer has been removed from the surface of the wafer and wherein

the chromium layer is deposited on the microscopically rough surface of the wafer in an intrinsic tensile stress with a low stress value.

Claim 13 (previously amended): In a method as set forth in claim 11 wherein the chromium layer is deposited on the surface of the wafer in a magnetron with no RF bias in the magnetron and with a low flow rate of molecules of an inert gas in the magnetron.

Claim 14 (previously amended): In a method as set forth in claim 11 wherein a chamber is provided in which to perform the recited steps and wherein molecules of an inert gas flow through the chamber in an order of three (3) to five (5) standard cubic centimeters per minute (3-5 sccm).

Claim 15 (previously amended): In a method as set forth in claim 12 wherein a chamber is provided in which to perform the recited steps and wherein a waferland is disposed in the chamber to support the wafer and wherein a layer of chromium is deposited on the waferland before the chromium layer is deposited on the surface of the wafer.

Claim 16 (previously amended): In a method as set forth in claim 11 wherein a waferland and a chamber are provided and the wafer and the waferland are disposed in the chamber and wherein

the chromium layer is deposited on the surface of the wafer in the chamber with no RF bias on the waferland in the chamber and with a low flow rate of molecules of an inert gas in the chamber,

the inert gas is argon and the flow rate of the molecules of the inert gas in the chamber is in the order of three (3) to five (5) standard cubic centimeters per minute (3-5 sccm).

Claim 17 (previously amended): In a method of providing for an attachment of an electrical component or sub-assembly to a wafer, the steps of:

removing a thin layer from the surface of the wafer,

depositing a layer of chromium on the surface of the wafer with a low intrinsic tensile stress, and

depositing a nickel vanadium layer on the surface of the chromium layer with an RF bias power to produce a low intrinsic compressive stress in the nickel vanadium layer for neutralizing the low intrinsic tensile stress in the chromium layer.

Claim 18 (previously amended): In a method as set forth in claim 17 wherein a layer of metal selected from the group consisting of gold, silver and copper is deposited on the surface of the layer of nickel vanadium and wherein

the nickel vanadium layer has a low intrinsic compressive stress to neutralize the low intrinsic tensile stress in the chromium layer and any stress in the metal layer selected from the group consisting of gold, silver and copper.

Claim 19 (previously presented): In a method as set forth in claim 18 wherein the electrical component is soldered to the layer of the metal selected from the group consisting of gold, silver and copper.

Claim 20. (currently amended) In a method as set forth in claim 18 wherein the wafer is disposed on a waferland and wherein

a layer of chromium is deposited on the waferland ~~before~~ [after] the thin layer is removed from the surface of the wafer and wherein

the electrical component is soldered to the layer of the metal selected from the group consisting of gold, silver and copper.

Claim 21 (previously amended): In a method as set forth in claim 20 wherein a lens shield is disposed in a spaced relationship to the waferland and the lens shield is grounded and wherein

the RF bias power for the deposition of the layer of nickel vanadium is provided between the waferland and the grounded lens shield.

Claim 22 (previously amended): In a method of providing for an attachment of an electrical component to a wafer, the steps of:

removing a thin layer from the surface of the wafer,
thereafter providing the surface of the wafer with a microscopic roughness,
thereafter depositing a layer of chromium on the microscopically rough surface of the wafer with a low intrinsic tensile stress, and
thereafter depositing a layer of nickel vanadium on the surface of the wafer with a low intrinsic compressive stress.

Claim 23 (previously amended): In a method as set forth in claim 21 wherein a layer of a metal selected from a group consisting of gold, nickel and copper is deposited on the surface of the nickel vanadium layer and wherein
a component is soldered to the layer of the metal selected from the group consisting of copper, gold and silver.

Claim 24 (previously presented): In a method as set forth in claim 23 wherein the layer of the chromium is deposited on the microscopically rough surface of the wafer with no RF bias.

Claim 25 (previously presented): In a method as set forth in claim 22 wherein the layer of chromium is deposited on the microscopically rough surface of the wafer at a low rate of the flow of an inert gas.

Claim 26 (previously presented): In a method as set forth in claim 24 wherein the layer of chromium is deposited on the microscopically rough surface of the wafer at a low rate of flow of an inert gas and wherein

an RF bias power is applied during the deposition of the nickel vanadium layer on the chromium layer to produce the low intrinsic compressive stress in the nickel vanadium layer.

Claim 27 (currently amended): In a method as set forth in claim ~~[[24]]~~ [[22]] wherein

the layer of the chromium is deposited on the microscopically rough surface of the wafer with no RF bias and wherein

the layer of chromium is deposited on the microscopically rough surface of the wafer at a low rate of flow of an inert gas and wherein

an RF bias power is applied during the deposition of the nickel vanadium layer on the chromium layer to produce the low intrinsic compressive stress in the nickel vanadium layer.

Claim 28 (previously amended): In a method as set forth in claim 27 wherein a layer of a metal selected from a group consisting of gold, nickel and copper is deposited on the surface of the nickel vanadium layer and wherein the component is soldered to the layer of the metal selected from the group consisting of copper, gold and silver.

Claim 29 (previously amended): In a method of providing a deposition on a surface of a wafer, the steps of:

removing a thin layer from the surface of the wafer to eliminate impurities from the surface of the wafer,

creating a microscopic roughness on the surface of the wafer, and
depositing a chromium layer with a low intrinsic tensile stress on the microscopically rough surface of the wafer.

Claim 30 (previously presented): In a method as set forth in claim 29 wherein the chromium layer is deposited on the microscopically rough surface of the wafer in a chamber and wherein

an inert gas having a low flow rate is passed through the chamber with no RF bias on the wafer, when the chromium layer is deposited on the microscopically rough surface of the wafer, to prevent molecules of the inert gas from being entrapped in the chromium layer.

Claim 31 (previously amended): In a method as set forth in claim 30 wherein the inert gas is argon.

Claim 32 (previously amended): In a method as set forth in claim 30 wherein the microscopic roughness is produced on the surface of the wafer by providing the molecules of the inert gas with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer.

Claim 33 (previously amended): In a method as set forth in claim 29 wherein no RF bias is provided when the chromium layer is deposited on the surface of the wafer and wherein

the chromium layer is deposited on the microscopically rough surface of the wafer in a chamber and wherein

an inert gas having a low flow rate is passed through the chamber, when the chromium layer is deposited on the microscopically rough surface of the wafer, to prevent the inert gas from being entrapped in the chromium layer and wherein

the inert gas is argon.

Claim 34 (previously presented): In a method as set forth in 31 wherein

the wafer is disposed on a waferland and wherein

a layer of chromium is deposited on the waferland, before etching the wafer surface, to prevent the layer of chromium deposited on the wafer from being contaminated by the material from the waferland.

Claim 35 (previously amended): In a method of preparing a wafer surface for receiving an electronic component, the steps of:

removing a thin layer from the surface of the wafer,

thereafter creating a microscopic roughness on the surface of the wafer by providing ions of an inert gas with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer, and

thereafter depositing a chromium layer on the microscopically rough surface of the wafer in a chamber in which a minimal amount of an inert gas is passed through the chamber during the deposition to prevent molecules of the inert gas from being entrapped in the chromium layer.

Claim 36 (previously presented): In a method as set forth in claim 35 wherein no wafer bias is produced on the wafer when the chromium layer is deposited on the surface of the wafer.

Claim 37 (previously amended): In a method as set forth in claim 35 wherein the chromium layer is deposited on the surface of the wafer under tension with a low amount of stress.

Claim 38 (previously amended): In a method as set forth in claim 36 wherein the chromium layer is deposited on the surface of the wafer with a low amount of intrinsic tensile stress.

Claim 39 (previously amended): In a method of providing a deposition on a surface of a wafer for receiving an electronic component on the wafer surface, the steps of:

removing a thin layer from the surface of the wafer,
creating a microscopic roughness on the surface of the wafer, and

atomically bonding a chromium layer to the microscopically rough surface on the wafer.

Claim 40 (previously presented): In a method as set forth in claim 39 wherein the chromium layer is deposited on the microscopically rough surface of the wafer with no RF bias.

Claim 41 (previously amended): In a method as set forth in claim 39, the step of: providing a low intrinsic tensile stress in the chromium layer.

Claim 42 (previously presented): In a method as set forth in claim 39 wherein the microscopic roughness on the surface of the wafer is provided by disposing the wafer in a chamber and by passing ions of an inert gas through the chamber with insufficient energy to etch the surface of the wafer but with sufficient energy to produce the microscopic roughness on the surface of the wafer.

Claim 43 (currently amended): In a method as set forth in claim 40 wherein ~~providing~~ an intrinsic tensile stress is provided with a low value in the chromium layer and wherein

the microscopic roughness on the surface of the wafer is provided by disposing the wafer in a chamber and by passing ions of an inert gas through the chamber with insufficient energy to etch the surface of the wafer but with sufficient energy to produce the microscopic roughness on the surface of the wafer.

Claim 44 (previously amended): In combination for performing electrical functions,

a wafer having a clean surface with a microscopic roughness, and

a layer of chromium deposited on the microscopically rough surface of the wafer with a low intrinsic tensile stress in the chromium layer.

Claim 45 (previously amended): In a combination as set forth in claim 44 wherein

the chromium layer is deposited on the microscopically rough surface of the wafer with a low intrinsic tensile stress at a rate of flow of an inert gas in the order of 3-5 SCCM.

Claim 46 (previously presented): In a combination as set forth in claim 44 wherein the microscopic roughness is provided on the surface of the wafer by ions of an inert gas with an insufficient energy to etch the surface of the wafer but with sufficient energy to produce the microscopic roughness on the surface of the wafer.

Claim 47 (previously presented): In a combination as set forth in claim 44 wherein

an atomic bonding is produced between the chromium in the chromium layer and the microscopically rough surface of the wafer.

Claim 48 (previously amended): In combination for performing electrical functions,

a wafer,

a chromium layer deposited on the wafer with a low intrinsic tensile stress, and

a layer of nickel vanadium deposited on the chromium layer in firmly adhered relationship to the chromium layer with a low intrinsic compressive stress.

Claim 49 (previously amended): In a combination as set forth in claim 48,
the chromium layer being under the low intrinsic tensile stress and the nickel
vanadium layer being under the low intrinsic compressive stress to neutralize the low
intrinsic tensile stress of the chromium layer.

Claim 50 (previously amended): In a combination as set forth in claim 48,
the chromium in the chromium layer having a low intrinsic tensile stress and an
atomic bonding with the microscopically rough surface on the wafer.

Claim 51 (previously amended): In combination for performing electrical
functions,
a wafer having a clean surface with a microscopic roughness, and
a chromium layer deposited on the microscopically rough surface of the wafer and
atomically bonded to the microscopically rough wafer surface.

Claim 52 (previously amended): In a combination as set forth in claim 51,
the chromium layer having a low intrinsic tensile stress for bonding to the
microscopically rough wafer surface.

Claim 53 (previously amended): In combination for performing electrical
functions,
a wafer having a clean surface,
a chromium layer disposed on the clean surface of the wafer with an intrinsic
tensile stress, and
a nickel vanadium layer deposited on the chromium layer with a low intrinsic
compressive stress.

Claim 54 (previously amended): In a combination as set forth in claim 53 wherein

the low intrinsic compressive stress of the nickel vanadium layer substantially neutralizes the low intrinsic tensile stress of the chromium layer.

Claim 55 (previously presented): In a combination as set forth in claim 53 wherein the clean surface of the wafer has a microscopic roughness and wherein the chromium in the chromium layer is atomically bonded to the microscopically rough surface of the wafer.

Claim 56 (currently amended): In a combination as set forth in claim ~~[[52]]~~ [[53]],
a layer of a metal selected from the group consisting of copper, gold and silver and disposed on the nickel vanadium layer with a low intrinsic tensile stress.

Claim 57 (previously amended): In a combination as set forth in claim 53 wherein

a layer of a metal selected from the group consisting of copper, gold and silver is deposited on the nickel vanadium layer and wherein

the nickel vanadium layer substantially neutralizes any intrinsic stress in the metal layer selected from the group consisting of copper, gold and silver.

Claim 58 (previously presented): In a combination as set forth in claim 53 wherein an electrical component is soldered to the layer of the metal selected from the group consisting of copper, gold and silver.

Claim 59 (previously amended): In a method of etching a surface of a wafer with a microscopic roughness, the steps of:

providing a flow of an inert gas in the order of forty (40) to fifty (50) standard cubic centimeters per minute through a chamber containing the wafer and at a relatively high gas pressure in the order of $4-6 \times 10^{-3}$ Torrs to remove a thin layer from the surface of the wafer,

thereafter providing a flow of an inert gas through the chamber at a flow rate of approximately forty (40) to fifty (50) standard cubic centimeters per minute and a power in the order of six hundred watts (600 W) to twelve hundred watts (1200 W) to remove impurities from the surface of the wafer and provide an anatomically rough surface,

disposing the wafer on a waferland, and

then providing a flow of an inert gas at a rate of approximately 40-50 standard cubic centimeters per minute through the chamber at a low power in the order of fifty watts (50 W) to one hundred watts (100 W) to provide the surface of the wafer with the microscopic roughness.

Claim 60 (previously amended): In a method as set forth in claim 59 wherein the power applied in the chamber to remove the impurities from the surface of the wafer is in the order of 600-1200 watts for approximately thirty (30) seconds and wherein the flow of the inert gas through the chamber to provide the surface of the wafer with the microscopic roughness occurs for a period of approximately sixty (60) seconds.

Claim 61 (previously presented): In a method as set forth in claim 59 wherein a layer of chromium is deposited on the microscopically rough surface of the wafer without any RF bias and at a low flow rate of the inert gas.

Claim 62 (previously presented): In a method as set forth in claim 59 wherein a layer of nickel vanadium is deposited on the surface of the chromium layer with an RF bias power of approximately 300 watts and with a flow rate of argon of approximately 5 sccm.

Claim 63 (previously presented): In a method as set forth in claim 60 wherein a layer of chromium is deposited on the surface of the waferland before the surface of the wafer is etched.

Claim 64 (previously presented): In a method as set forth in claim 60 wherein the nickel vanadium layer is deposited on the chromium layer with a power of approximately six thousand watts (6000 W), with a flow rate of argon of approximately five (5) sccm and with RF power of approximately three hundred (300) watts.

Claim 65 (previously presented): In a method as set forth in claim 29 wherein the chromium layer is deposited with a low intrinsic tensile stress on the microscopically rough surface by providing the layer with no RF bias.

Claim 66 (previously presented): In a method as set forth in claim 29 wherein the microscopic roughness is created on the surface of the wafer by providing ions of an inert gas on the surface of the wafer with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer.

Claim 67 (currently amended): In a method as set forth in claim 1 wherein
the inert gas is argon and wherein
the wafer [[is]] disposed on a waferland and wherein
a layer of chromium is deposited on the waferland after the microscopic roughness
has been produced on a the surface of the wafer.

Claim 68 (previously presented): In a method as set forth in claim 22 wherein
the microscopic roughness on the surface of the layer is created by providing ions
of an inert gas on the surface of the wafer with an insufficient energy to etch the surface
of the wafer but with a coefficient energy to create the microscopic roughness on the
surface of the wafer.

Claim 69 (previously presented): In a method as set forth in claim 39 wherein
the microscopic roughness is created on the surface of the wafer by
providing ions of an inert gas on the surface of the wafer with an
insufficient energy to etch the surface of the wafer but a sufficient energy to create
the microscopic roughness on the surface of the wafer.